

the breaking-up of the genera and species in question into two or more. But what precise extension is given to the terms genera and species is purely a matter of taste; the actual facts are in no way affected. Further, whether we have to do with actual or assumed continuity in time and space, the warrant for the conception of species disappears: for historical-geographical considerations it is too contradictory; the ideas of species as something separating, and of development in time and space, are incommensurable. Thirdly, for the purpose of our present study it does not matter at all whether the representatives are regarded as identical species, or as different forms of the same species, or as nearly related species. The point is in the evidence of close relationship, and it does not matter much what systematic expression we give to this fact.

CONCLUSION.

We have now reached the end of our study. We have seen that the faunas of higher latitudes represent the coeval relics of the almost uniformly developed and almost universally distributed Early Tertiary faunas, as they have been evolved under the influence of the cooling of the climate, by a process of separating out and selection. The similarity of the operating causes secured that the same components of the old fauna remained behind in both north and south; and thus has arisen the great and still well-marked similarity of the two faunas.

XLI.—*On a Collection of Spiders from the Bahama Islands made by J. L. Bonhote, Esq.; with Characters of a new Genus and Species of Mygalomorphæ.* By F. O. PICKARD
CAMBRIDGE, B.A.

[Plate VII.]

A SMALL but valuable collection of Arachnida was made in the neighbourhood of Nassau by Mr. Bonhote and presented to the British Museum. Amongst other interesting forms were two adult males of the family Theraphosidæ, large hairy spiders locally termed Tarantulas. For these a new genus has been made, and the species is also new: it is characterized by the presence of stridulating-spines on the trochanters of the first pair of legs and the palpus.

Should this paper fall into the hands of anyone interested in the natural history of their surroundings, situated in any of the islands of the Antilles, I would like to urge that collections, however small, are always valuable when brought from adjacent islands forming a large group, more especially if a number of examples of the commoner and more obvious forms be sent also.

In this way alone can we determine the identity of the many forms which have been described from different islands as distinct species; and by securing sufficient material we may be able to trace the gradual transition of a species through successive islands until it passes into some extreme form which has hitherto perhaps been regarded as a distinct species.

Given a sufficient lapse of time, each island may produce, from the same original form common to the whole district before its separation into groups of isolated islands, a species, or at all events a local race, peculiar to itself, diverging under different conditions, prevented by physical obstacles from interbreeding with those of neighbouring islands, and thus at last perhaps becoming a true species, physiologically distinct as well as geographically separated; for in dealing with forms in which the male and female are each highly specialized individuals of different sexes the distinctness of two species must depend on whether they will cross-breed or not normally, as a rule, under natural conditions of life. If they interbreed freely they cannot be distinct species, while if they interbreed occasionally, but not as a general rule, the two forms may be gradually becoming divergent, and finally become physiologically distinct.

A variety is held to be an individual variation of either sex where these sexes interbreed freely. A local race is composed of individuals all of whose members differ slightly but constantly from those of apparently the same species in another locality more or less isolated from the first. The question as to what is a species, a local race, and a variety is impossible to settle definitely so long as the natural process of the separating into groups and the elimination of intermediates is in progress.

Thus it is of very great interest to learn how far forms which have probably been geographically separated for centuries have passed through the stage of individual variation, have reached the status of local races, or have already become physiologically distinct species.

The conditions for the observation of these phenomena ought to be exceedingly favourable throughout the numerous

islands of the Greater and Lesser Antilles and the more adjacent regions of the mainland all round.

If it be asked what are the final tests of a distinct species of spider, one can only say that a long course of experimental interbreeding under perfectly natural conditions, settling which would breed together and which not, might solve the problem. Such an investigation being impossible, one has to fall back on the comparative anatomy of the genitalia. If these are identical in a number of individuals of different sexes, the latter are held to belong to one and the same species. If not structurally identical, then the forms are regarded as distinct species, on the supposition that two different forms of male organ are not adapted to the fertilization of one form of the female organ.

Fam. Theraphosidæ.

LYROSCELUS, gen. nov.

Femur iv. not scopulate on inner side. Tarsal pads not divided; scopula interspersed with a few scattered hairs only towards the base. Protarsus i. scopulate to base, with a single spine on inner side only at the base. Apex of tibia i. bicalcarate. Protarsus iv. scopulate at extreme apex only. Legs spinulose, especially iii. and iv. Apical third of labium and inner anterior angle of coxa of pedipalp spinulose. Trochanter of leg i. with 10-12 stout clavate stridulating-spines on the inner side, extending over the upper two thirds of the segment; opposed to these are 15-16 long, stout, slightly clavate spines, situated on the outer side of the trochanter of the pedipalp, extending over the central half of the segment.

Lyrosceus Bonhotei, sp. n. (Pl. VII. figs. 6, 6 a.)

Colour. Carapace clothed with a very pale bronze covering of shaggy hair. Mandibles brown, with a basal dorsal clothing of the same pale bronze hairs. Legs clothed with coffee-brown hairs, interspersed on the protarsi and tarsi with long scattered rufous hairs. Femora and patellæ of legs, especially i. and ii., clothed with golden-bronze hairs over the dorsal and externo-lateral areas.

Abdomen clothed with darker coffee-brown hairs, interspersed, especially towards the spinners, with long rufous hairs.

Sternum and coxæ of legs coffee-brown; coxæ of pedipalp and fringe on fang-groove of mandibles bright rufous.

Measurements.—Carapace 18 × 15 millim.; pat. + tib. i. and

iv. 20 millim.; protarsus i. 13 millim.; protarsus iv. 18 millim.

Tibia of pedipalp with a low convex tubercle on the outer side towards the apex. Bulb short, piriform, aculeate, its apex (from in front) only slightly directed outwards.

Tibia of leg i. with two stout spurs at apex, the outer long and strongly curved upward and inward, with a stout coalescent spine at its apex on the inner side. The inner spur much shorter, broad, with a stout almost coalescent spine on its inner side.

Two adult males of this fine species were taken at Nassau in the Bahamas by Mr. J. L. Bonhote. The position of the stridulating-spines is a new one, for although the form of the spines is similar to that in *Citharoscelus*, Poc., yet they occur on different segments of the two appendages, namely, in the latter on the coxa, in the former on the trochantur. *Citharoscelus*, moreover, belongs to a different group, having the protarsus i. scopulate only halfway to the base.

Fam. Filistatidæ.

Filistata hibernalis, Hentz.

Adults of both sexes of this species, which is abundant in other islands of the Antilles as well as in North, Central, and South America, were taken in the Bahamas.

Fam. Heteropodidæ.

Heteropoda venatoria (Linn.).

Two very richly coloured adult males from Nassau.

Fam. Argyropidæ.

Nephila clavipes (Linn.). (Pl. VII. figs. 1-4.)

Two adult females and an adult male were taken by Mr. Bonhote at Nassau of a species of *Nephila* which is most probably identical with that figured in Browne's 'History of Jamaica.' This figure is the type of *Araneus clavipes* of Linnæus, which has usually been distinguished from *N. cornuta* (Pallas) (Pl. VII. figs. 5, 5 a) by the absence of the two small horns on the carapace.

Another character distinguishing various examples of *Nephila* lies in the tufts of hair on the legs. Some have them very distinct and large on the tibiæ and femora of legs i. and ii. and the tibiæ of iii. and iv., while in others they are

much less evident and almost or entirely absent on the femora.

Several of these forms have been described as different species by various authors, the differences being based on the presence or absence of the horns on the carapace and the nature of the tufts on the legs.

I am, however, myself not able to confirm the distinction of species on these characters, and strongly suspect that in reality there is only one species embracing all these forms. It is therefore very important that we should be able to examine males and females of these large and easily recognizable spiders from as many of the islands of the Greater and Lesser Antilles as possible, and especially from Jamaica, for it was in this island that the type of *Ar. clavipes* of Linnæus was taken.

At first sight it might be supposed that there were either *two* species, one with and the other without the cephalic horns, and two varieties of each of these, one with the legs thickly tufted and the other with the legs much less densely clothed with hairs; or that there were *four* species, two of each group of horned and not-horned forms, based on the differences in the leg-tufts.

There is another possibility that the horns are not of specific importance, while the tufts on the legs are. This would give us two species, the presence or absence of horns being ignored.

One is, however, strongly urged to the conclusion that neither of these characters is of specific importance, because after comparing many examples of the forms known as *clavipes*, Linn., and *cornuta*, Pallas, of both sexes, it is seen that the males of both these forms are inseparable; the palpal organs are identical in form. That is to say, that the *males* of the pure *clavipes*, whose females are without tubercles on the carapace and have dense tufts on the femora and tibiæ of i. and ii. and on tibia iv., cannot be distinguished from the males of the pure *cornuta*, whose females have two distinct tubercles on the carapace and scarcely any fringing hairs on legs i., ii., and iv. However, there is not sufficient material to be absolutely sure that this is the case, though of the former there are adult males and females in Mr. Bonhote's collection, and also others in the British Museum; while of the latter I have myself taken many examples on the Lower Amazons, and one pair actually in copulation.

Of the females, then, there are four distinct forms:—

- i. Hairs on the legs tufted and the femoral tuft also very distinct.
a. Carapace with tubercles.
b. Carapace without tubercles *clavipes*, Linn.
- ii. Hairs on the legs not tufted and femoral fingers almost obsolete.
a'. Carapace with tubercles *cornuta*, Pallas.
b'. Carapace without tubercles.

Of the males I am able so far to identify only one form undoubtedly assignable to each of the two species above designated as *clavipes* and *cornuta*.

Examples from various localities in the British Museum collection are referable as follows:—

The Bahama Islands.—Examples of the female sex have tufted legs, without cephalic tubercles: *i. b.*

St. Domingo.—Females without tubercles and without tufted legs: *ii. b'.*

Bermuda.—Females with tufted legs and without tubercles: *i. b.*

Trinidad.—Females with tufted legs and with cephalic tubercles: *i. a.*

Venezuela.—Females with tufted legs and strong cephalic tubercles: *i. a.*

Caraccas.—Females with tufted legs, but tubercles almost obsolete: *i. a.*

Demerara.—Females with tubercles, without leg-tufts: *ii. a'.*

Pernambuco.—Females with tubercles, with leg-tufts: *i. a.*

Amazons.—Females with tubercles, without tufted legs: *ii. a'.*

New Granada.—Females with small tubercles and both forms of legs: *i. a, ii. a'.*

Mexico.—Females with tufted legs and without tubercles: *i. b.*

California.—Females with tufted legs and without tubercles: *i. b.*

Neither of these two characters therefore appears to be constant; the tufts on the legs vary in length and extent, while the tubercles range from nothing upwards; and since the males of the extreme forms cannot be separated, it is highly probable that all these females are varieties of one species.

I would therefore urge upon those who have leisure in any of these islands to send home at any rate a few examples of the females as well as of the males of these gigantic spiders. Both sexes may be found in the proper season in the large wheel-like orb-web which forms so conspicuous a feature in tropical and subtropical gardens, open spaces, and forest; but the male is a minute and very different-looking spider from the female.

GASTERACANTHA, Sundevall, 1833.

The subjoined are the more important forms of this genus occurring in the Central-American and Antillesian region.

Though the species are very variable individually, they may be recognized by the following characters:—

- A. Abdomen with four spines only, median and posterior.
1. Spines short, triangular, and equal in length. Colour variable. Carapace and legs varying from bright orange-red, the latter annulate, to black throughout; in this case there are deep cyanine reflections. Abdomen black or yellow, with black margins and blotches. Sternum and ventral area of abdomen black, the latter often with more or less yellow round the spinners and with yellow spots near posterior margin *tetracantha*, Linn.
 2. Spines longer and more conical, unequal in length. Medians longer and stouter than the posterior spines. Colour variable. Carapace and legs bright orange-red, the latter annulate or entirely black. Abdomen entirely yellow or entirely black; spines orange-red or black *Caustrinii*, O. P. Camb.
- B. Abdomen with six spines.
1. Abdomen (not including spines) about one fourth broader than long. Spines unequal, anterior smaller than median, often obsolescent. Lateral spines longer than the posterior. Colour very variable. Carapace and legs bright orange-red, latter annulate or entirely black. Abdomen entirely black or entirely yellow, or yellow more or less variegated with black or *vice versa*. Ventral area of abdomen usually black, spotted throughout with yellow. Spines orange-red or black *?canceriformis*, Linn.
 2. Abdomen (not including spines) about one half broader than long. Spines equal (anterior and median), posteriors larger. Anterior and median spines very small and sharp. Colour similarly variable. Anterior angles at the base of the spines and base of medians often with a large rounded blotch, black on yellow. Ventral area black, often lined with yellow, but not spotted *Kochii*, Butler.

Gasteracantha tetracantha (Linn.).

Aranea tetracantha, Linn. Syst. Nat. ii. p. 1037. no. 45.—St. Thomas.
Gasteracantha pallida, C. K. (Marx), Die Arach. xi. p. 60, fig. 881.—California.
G. quadridens, C. K., t. c. p. 59, fig. 880.—St. Thomas.

G. pallida, McCook, Amer. Spid. iii. p. 209, pl. xiv. fig. 8.—California.
G. preciosa, McCook, Amer. Spid. iii. p. 211, pl. xiv. fig. 7.—California.

The species *pallida* and *preciosa* are in all probability identical, and may be eventually regarded as subspecies of Linnæus's species from St. Thomas. I have no doubt, however, that *quadridens*, C. K., is identical with *tetracantha*. Two other forms—one from St. Vincent, with carapace, legs, sternum, and ventral area entirely black; the other from Beguia, Canonan and Union Islands, with carapace and legs bright orange-red, sternum and ventral area black, the latter spotted with yellow—may be added to the varieties of this species. The form with the red carapace is obviously the typical one, though I have no material from the Island of St. Thomas, for Linnæus's description runs:—"Cap. rufum, pedes sanguinei."

The species as recognized above has been recorded from the Antilles, St. Thomas; St. Vincent (*Simon*); Beguia; Canonan and Union Islands; California, Mohave Desert (*Marx*).

Gasteracantha cancriformis (Linn.). (Pl. VII. fig. 11.)

Aranea cancriformis, Linn. Syst. Nat. ii. p. 1037. no. 46 (misprinted 45).
 —Jamaica.

Ar. hexacantha, Fabr. Mantissa Insectorum, p. 344. no. 29.

Ar. hexacantha, Fabr. Ent. Syst. t. ii. p. 417. no. 39.—Jamaica.

Abbott, Spiders of Georgia, fig. 118.—Georgia.

Epeira cancer, Hentz, Sp. U. S. p. 126, pl. xiv. fig. 13.—Florida.

Plectana cancriformis, Wlk. Ins. Apt. ii. p. 151.

P. ellipsoides, Wlk.—Georgia.

Gasteracantha picca, C. K., Die Arach. xi. p. 61, fig. 882.—Brazil.

G. velitaris, C. K., *op. cit.* iv. p. 33, fig. 269.—Brazil.

G. rubiginosa, C. K., *op. cit.* xi. p. 55, fig. 878.—Haiti.

G. atlantica, Wlk. Ins. Apt. ii. p. 167.—Haiti.

G. conchata, Mart. (sec. Walek.).

G. callida, O. P. Cambr. P. Z. S., March 1879, p. 284, pl. xxvi.
 fig. 7.—Trinidad.

G. vittata, Thor.—California.

G. cancriformis, McCook, Amer. Sp. iii. p. 211, pl. xiv. fig. 9.—
 United States.

The type of *A. cancriformis*, Linn., is the figure in Sloane's 'Jamaica,' ii. p. 197, t. 235. fig. 4. Linnæus also quotes Browne, Hist. Jamaica, p. 419, t. xlv. fig. 5. (These figures have been reproduced in our Pl. VII. figs. 9 & 8.)

The type of *A. hexacantha*, Fabr., is the figure in Browne's Hist. Jamaica, t. xlv. fig. 5. Fabricius does not mention "Dom. Banks" in either of the places where he quotes and describes *Ar. hexacantha*; and although there is a specimen labelled with this name as "type" in Coll. Banks Brit. Mus., it cannot be accepted as the type of Fabricius's species.

In spite of Walckenaer's decision to the contrary, it is very evident that the figures in Sloane and Browne represent the same species, being also from the same locality. The difference in the length of the spines, which Walckenaer lays special stress upon, is no criterion whatever, while the number of sigilla between the anterior spines is the same in all members of the genus. Although Walckenaer says that he compared the types of the two forms described by Fabricius as *canceriformis* and *hexacantha*, and that they were certainly not identical, yet the characters he mentions as distinguishing the two are of little value. Fabricius, too, quotes Browne's figure t. xlv. fig. 5 (it is misprinted in one place t. xiv.) under both these species, and it is difficult to understand on what grounds this author gave it another name.

A. hexacantha, Fabr., therefore becomes a synonym of *canceriformis*, Linn.

Although I have not any examples of this six-spined form from Jamaica, there are many from other islands in the Antilles (Haiti, Trinidad, &c.) in the British Museum collection, and also from Georgia and Venezuela. There are also examples identified by Keyserling as *vittata*, Thor., which are most probably a small form of *canceriformis*, being also almost identical with another series from the Bahamas. In these the anterior spines are obsolescent. The length of these spines varies considerably even in the few examples from the Bahamas, and we may look for many varieties of this spider from different localities. It is possible that some of these forms may have to be recognized as subspecies, and I cannot, with only the present material at hand, be sure whether this or the form *Kochii* is the true *canceriformis*, Linn.

In addition to the localities mentioned above, this species has been recorded from Texas, North Carolina, New Mexico, Florida, Alabama, Arizona, and Mr. Bonhote has taken it in the Bahamas.

Gasteracantha Canestrinii, O. P. Cambr. (Pl. VII. fig. 12.)

Gasteracantha Canestrinii, O. P. Cambr. P. Z. S. 1879, p. 293, pl. xxvi. fig. 2.—Antigua.

This species has but four spines, the anterior pair being absent. Otherwise it is very like smaller examples of *canceriformis*, especially those from the Bahamas, in which the anterior spines are obsolescent.

Examples in the British Museum are from Antigua (*Forest*) and Dominica (*Dr. Nicholls*).

Gasteracantha Kochii, A. G. Butler. (Pl. VII. fig. 10.)

Gasteracantha Kochii, Butler. Type in Coll. B. M. *Hab.* Pará. Nom. nov. for *hexacantha*, C. K., Trans. Ent. Soc. Lond. 1873, p. 169, no. 66.

This is obviously identical with *G. hexacantha*, C. K. (non *hexacantha*, Fabr.).

There are many examples of this form from various parts of America in the Museum collection. In the Keyserling collection from Taguava, Mexico, Bogotá, and Rio Grande do Sul. Also from Upper Surinam, San José (Costa Rica), Ecuador (*Rosenberg*). Colombia, Lower Amazons, Pará, collected by the author; I have taken it also in the forest near Santarem.

It may be recognized by the shape of the abdomen being rectangular, much broader than long; the anterior and lateral (or median) spines are very short and of equal length, the posterior spines larger.

The examples from Ecuador are very stout and convex below, others from other regions are much more compressed. They vary also very much in coloration. These great differences, however, in examples of the same species will be quite familiar to those who have ever collected a large series of any species of the genus in their natural habitat. I have often myself, in picking them with the fingers out of their webs, felt some of them nearly flat and others quite convex, and been surprised that they were not different species.

Gasteracantha insulana, Thor.

Gasteracantha insulana, Thor.—Galapagos Islands.

If the example from this locality in the British Museum collection be rightly identified, this form is probably identical with *Kochii*, Butler, but one cannot be sure without a larger series of specimens.

It is possible that *G. sexserrata* (Wlk.), Ins. Apt. ii. p. 157, Cayenne; *G. quinque-serrata* (Wlk.), ii. p. 157, Guyana; *G. triserrata* (Wlk.), ii. p. 158; and *G. Servillii* (Wlk.), ii. p. 159, Brazil, are all *G. Kochii*, Butler; and if so, the last name will go as a synonym of *sexserrata*. Possibly *G. mammosa*, C. K., xi. p. 57, Brazil, is *canceriformis*, Linn.; but what *G. lata* (Wlk.), ii. p. 165, from Guadaloupe, may be, is very doubtful.

Argyropeira argyra (Walck.) (sec. Simon, St. Vincent).

Argyropeira argyra (Walck.), Ins. Apt. ii, p. 219.

A single adult female, Nassau.

This example is identical with Simon's named specimens from St. Vincent.

Uloborus geniculatus, Oliver.

Uloborus geniculatus, Oliver, Encycl. Method. ii, p. 214.

A single adult female. This species is found all over the tropical world, occurring in abundance in the windows of outhouses, where the delicate pink many-cornered cocoons may be seen hanging in the web.

Nassau.

Uloborus americanus, Walck.

Uloborus americanus, Walck. Ins. Apt. ii, p. 229.

This species may instantly be distinguished from the above by the tuft of hairs on each side of tibia i. near the apex.

A single adult female from Nassau.

Alcimosphenus licinus, Simon. (Pl. VII. fig. 7.)

Alcimosphenus licinus, Simon, Hist. Nat. Ar. ii. t. i. p. 931, and P. Z. S. Nov. 16, 1897, p. 871.

Several adult females of this fine spider were obtained at Nassau. The figure on the Plate is taken from one of the syntypes of the form originally described by Simon from St. Vincent.

EXPLANATION OF PLATE VII.

- Fig. 1. *Nephila clavipes* (Linn.), ♀. 1 a. Carapace in profile; 1 b. Abdomen, showing pattern.
- Fig. 2. Ditto, ♂.
- Fig. 3. Ditto, ♂. Palpus.
- Fig. 4. Ditto, ♂. Palpal bulb and spine.
- Fig. 5. *Nephila cornuta* (Pallas), ♀. Leg i. 5 a. Carapace in profile.
- Fig. 6. *Lyrosceles Bonholtei*, sp. n., ♂. Trochanter of male palpus from the outside. 6 a. Bulb of palpus.
- Fig. 7. *Alcimosphenus licinus*, Simon, ♀.
- Fig. 8. Browne, Hist. Jam. t. xlv. fig. 5.
- Fig. 9. Sloane, Voy. Jam. t. 235. fig. 4.
- Fig. 10. *Gasteracantha Kochii*, Butler.—Santarem.
- Fig. 11. *Gasteracantha cancriformis* (Linn.)?—Bahamas.
- Fig. 12. *Gasteracantha Canestrinii*, O. P. Cambr.—Antigua.